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GEOGRAPHICAL RECORD

NORTH AMERICA

A Rune Stone in Minnesota as a Possible Indication of a Norse Expedition in 1362. The imprimatur of the Wisconsin Historical Society upon an article reprinted from the *Wisconsin Magazine of History* (Vol. 3, No. 2, December, 1919), entitled "The Kensington Rune Stone: Is It the Oldest Native Document of American History?" by H. R. Holand, justifies one in expecting a substantial contribution. And we are not disappointed in the argument and conclusions of the author of this extremely interesting analysis.

The subject of the paper is most unusual. There was found in 1898 at Kensington (a Minnesota village situated in the belt where the great coniferous forest of the North gives way to the open grassland of the Great Plains) a slab of stone 30 inches long, 17 inches wide, and 7 inches thick, and weighing about 230 pounds, the face and one side of which for three-fifths of its length are covered by an inscription in Runic characters. The stone was found under the stump of a tree whose roots embraced it securely. When the characters were deciphered the following inscription was made out:

> Eight Goths [i.e. natives of Gothland, Sweden] and twenty-two Norsemen on exploration-journey from Vinland through the western regions. We had camp by two skerries one day's journey north from this stone. We were [out] and fished one day. When we came home [we] found ten men, red with blood and dead. Ave Maria! Save [us] from evil!
>
> [We] have ten of our party by the sea to look after [or for] our vessels 14 days' journey from this island. Year 1362.

The inference from the inscription is that Norsemen conducted an expedition to the middle of the continent in 1362, and the argument of the author is devoted to a review of the previous discussions—some of which considered the stone as a forgery—and to an analysis of the historical and linguistic probabilities. The attitude of the author is conservative. He argues for the authenticity of the inscription on five principal grounds:

> (1) The position of the stone *in situ* and the practical impossibility of its having been placed in position by a man of eminent runic, linguistic, and historical accomplishments 100 miles from the nearest habitation in an unsettled wilderness.
>
> (2) The weathered appearance of the stone, showing that it had not been recently engraved.
>
> (3) The interpretation of the 14 days' journey in terms of the Norse idea of a "day's journey," which meant not a day on foot but the distance covered in a day's sail with a fair wind. Taking this to mean about 80 miles, the 14 days would be equivalent to 1120 miles, or approximately the distance from Hudson Bay to Kensington if allowance be made for a winding course.
>
> (4) The numerals, which long mystified students and which were not properly interpreted until 1909, when Helge Gjessing, a philologist of Christiania, showed that the numerals were "in perfect accord with runic numerals used in the Middle Ages."
>
> (5) The use of "Ave Maria! Save from evil!" which, written in part in Latin characters and with this peculiar wording, seems to show that it was written in the Middle Ages.

Mr. Holand concludes that these arguments, when considered together, leave little doubt that we have in the inscription an actual and important record dating from the fourteenth century. "It seems obvious that it would be impossible for a present-day forger to construct an inscription of such length and multiplicity of ideas without leaving indubitable proof of his forgery. Particularly would this be true of an inscription purporting to date from the fourteenth century, which is a peculiarly difficult period linguistically, runologically, and historically. The multitude of errors which critics have made in reviewing the inscription shows the difficulties any one of these men would have encountered if he had attempted to invent such an inscription. Yet this inscription, coming from an uninhabited wilderness, has survived all attacks made upon it for more than twenty years.

"In view of this and in view of the great significance of its message, it is surely time for our learned societies and institutions to cease their 'waiting and watching' attitude and take energetic action in thoroughly investigating the subject."

A New Snowfall Map of the United States. In 1913 Dr. Charles F. Brooks published an average annual snowfall map of the United States based on observations made at about 2,000 stations during the fifteen winters from 1895 to 1910 ("The Snowfall of the United States," *Quart. Journ. Royal Meteorol. Soc.*, Vol. 39, 1913, pp. 81-84, Pl. 2). This map has recently been reprinted in this country (R. DeC. Ward: The Snowfall of the United States, *Scientific Monthly*, Vol. 9, 1919, pp. 397-415). In the case of earlier maps the observations which were used came mostly from near sea level, and for that reason the heavy snowfalls on the mountains and at the higher elevations generally were not indicated. In Dr. Brooks's map use was made of observations obtained at the higher altitude as well as the lower. Topographic effects were also taken into account, and the map therefore showed, for the first time, the actual conditions of snowfall over the whole country with as close an approach to accuracy as was possible with the available data.

In the *Monthly Weather Review*, Vol. 47, 1919, Chart XVII, there is now published a new map of the average annual snowfall of the United States, originally prepared by J. B. Kincer of the Weather Bureau from all available records in the Western mountains and from the complete records east of the Rockies for the period 1895-1914. The map was then revised somewhat by Dr. Charles F. Brooks in order to bring it into conformity with certain obvious topographic influences, as well as with the previously published detailed map for the region east of the Mississippi, 1895-1913 (C. F. Brooks: The Snowfall of the Eastern United States, *Monthly Weather Rev.*, Vol. 43, 1915, pp. 2-11, Pl. 43), and of New England, 1895-1916 (C. F. Brooks: New England Snowfall, *ibid.*, Vol. 45, 1917, pp. 271-285, Fig. 30, on p. 285). The basic averages for the 20-year period of Kincer's original map have, however, been retained. The new map shows depths of snowfall for 0, 1, 5, 10 inches, and then for every 10 inches up to 60 inches.

The most striking points of difference between the Brooks map of 1913 and the modified Kincer map of 1919 concern the lines indicating the heaviest annual snowfalls. In Dr. Brooks's map lines showing depths of 100, 200, 300, and over 400 inches were drawn over portions of the Sierra Nevada and the Cascade Range, while lines showing amounts of over 100 inches were shown over fairly large areas of the Rocky Mountain system even as far south as northern New Mexico, reaching over 300 inches in southern Wyoming and 400 inches in parts of the Colorado Rockies.

On the map constructed by Kincer no amounts of over 60 inches are indicated by lines over any portion of the western United States, depths in excess of 60 inches being shown in figures. Thus, an observation of 527 inches is indicated over the central Sierra Nevada, this being the maximum snowfall shown anywhere on the map. Further, 459 inches are shown over the northern Cascades, in Washington; and 430 inches over the Cascades of Oregon. In the Rocky Mountain area a maximum depth of 337 inches is shown in the mountains on the Colorado-New Mexico border; of 298 inches in north-central Colorado, and of 250 inches close to the Idaho-northeastern Oregon line.

Over the eastern United States the two maps are naturally much more alike, because the annual depths of snowfall exceed 60 inches only over relatively small areas. The new map emphasizes somewhat more clearly the topographic effects of the northern portions of the Appalachian Mountains, especially in West Virginia and in New England. Both maps agree in showing annual snowfalls of over 100 inches in northern New England, at the eastern end of Lake Ontario, and along the Lake Superior shores of the northern peninsula of Michigan. The lines of equal depth of snowfall up to 400 inches, on Dr. Brooks's map, thus inevitably bring out very emphatically the heavy snowfall on the Western mountains, whereas the new Kincer map shows depths greater than 60 inches in the West only by printing the figures for scattered points. The latter method adheres more rigidly to the actual observations and allows less latitude to the individual judgment in interpolating the probable effects of topography. The former thus brings out more clearly the heavier snowfalls on the mountains; the latter is more strictly accurate. R. DeC. Ward

AFRICA

Eolian Denudation in Relation to the Diamond Deposits of the Southwest African Protectorate. The prosperity of former German Southwest Africa was based upon the diamond discoveries of 1908. Diamonds formed the bulk of the exports of the colony—80 per cent in the year preceding the war—and constituted its chief source of revenue. The occurrence of the diamond here presents problems in economic geology whose interest has been generally heightened by the late change in administration. A brief discussion of the controlling physical conditions has recently been given by R. F. Rand in the paper "Angra Pequena (Lüderitzbucht) and Subaerial Denudation" (*Geol. Mag.*, January, 1920, pp. 32-35).

The Southwest African diamonds are found in a coastal strip extending from Conception Bay, 100 miles south of Swakopmund, to a point some 60 miles north of the mouth of the Orange River, the richest fields being south and east of Lüderitzbucht (the Angra Pequeña of Bartolomeo Diaz). No diamonds have been found at a distance of more than 15 miles from the sea. Within this area the stones are found for the most part in the gravels flooring the broad, dry valleys. Their distribution is controlled by the prevailing south-southwest wind, which in the summer months blows almost daily with hurricane force. The wind appears to be purely coastal and to occupy only a shallow stratum of the atmosphere. Within its limited range, however, extraordinary effects of eolian denudation are accomplished in this desert terrain—effects well described by Harger in "The Denudation of the South African Continent" (*Trans. and Proc. Geol. Soc. of South Africa*, Vol. 16, 1913).

The topography of low ridges and rugged hills, the variable rock structure and composition afford ample scope for the carving of the fantastic forms that appear in the honeycombed and wind-bitten surfaces. The detrital material is accumulated in the broad-floored valleys and depressions in which the uppermost portion is lashed by the wind into "regular waves and miniature dunes." In the sifting process the diamonds and other heavy particles find their way to the surface and crests of the waves. Furthermore there is an enrichment on the windward side of obstacles and at the heads of valleys facing the direction of the wind.

Further responsibility attributed to the wind in the disposition of the diamonds is dependent on the origin credited to the diamonds. The primary source has been variously ascribed to the country rock; to a terrain in the interior either of the Protectorate or of the Union of South Africa whence the diamonds are carried down by the streams, in the latter by the Orange River and thence northward by the Benguela Current; to a submerged area off the coast. These several theories have been outlined by Wagner, who brings forward considerable evidence in favor of the last (P. A. Wagner: The Geology and Mineral Industry of South-west Africa, *Union of South Africa Geol. Survey Memoir No. 7*, Pretoria, 1916). Rand, however, "sees no reason why the enrichment should not have taken place from a landward area, and not necessarily from seawards" and thus that the south-southwest wind "may be entirely responsible for the denudation of the parent diamond-bearing rock as well as for the concentration of the diamonds after being set free." In this connection it may be remarked that the area in which the wind operates is approximately defined by the seaward limits of the aloe, *Aloe dichotoma*, an arborescent form which, common in the interior, is unable to stand the coastal wind.

AUSTRALASIA AND OCEANIA

The Adaptability of the White Man to the Tropics in Australia. The adaptability of the white man to the tropics is discussed more vigorously in Australia than almost anywhere else. The *Review* has commented (*Geogr. Rev.*, Vol. 4, 1917, pp. 401–403; Vol. 5, 1918, p. 86; Vol. 8, 1919, pp. 101–106) on the climographs of Taylor, which show how widely central and northern Australia depart from the climatic types best suited to the white man. A more favorable view is presented by Drs. A. Breinl and W. J. Young of the Australian Institute of Tropical Medicine at Townsville, Queensland (Tropical Australia and Its Settlement, *Annals of Tropical Medicine and Parasitology*, Vol. 13, No. 4, March 15, 1920, pp. 351–412). Their paper begins with a good section on the Australian climate in general and ends with an admirable section on life in northern Australia—the hot and stupidly built houses of galvanized iron, the great use of alcohol, the failure of many settlers to wear cool enough clothing and broad enough hats, the seasonal occupations, the migratory life, the high wages, and the hot season when "the least exertion causes profuse perspiration," and when, even at night, "although at rest with doors and windows wide open, one perspires freely and wakens up in the morning unrefreshed and more tired than one felt on going to bed."

Between these two geographical sections come two medical sections, one excellent, and one curiously inadequate and misleading. The excellent section discusses the changes in the physiology of the white race within the tropics and is worth summarizing.

(1) Body temperature. Same as elsewhere when at rest: essentially the same for all races. With exercise, however, the temperature rises more quickly than in cooler regions and falls more slowly. Much exercise has the same effect as a mild fever.

(2) Respiration. The rate is decidedly high, presumably to increase evaporation and thus reduce the body temperature. Abundant evidence indicates that evaporation from the lungs and skin has far more to do with the temperature of the body than has the amount of chemical activity.

(3) Blood pressure. No permanent change, but probably greater temporary variations after exercise.

(4) Blood conditions. Slight relative decrease in red corpuscles. The white corpuscles (leucocytes) not only increase in number but show more polymorphonuclear

neutrophile leucocytes among which a larger percentage have nuclei with only one or two instead of several fragments. The eosinophile leucocytes diminish. The exact significance of these conditions is not known, but our authors do not think them important. Except in disease there is no change in the specific gravity of the blood, and "the popular belief of the 'thinness of the blood' after prolonged residence in the tropics is, apart from anemia, due to disease, only a myth."

(5) Metabolism. Judging by the amount of food consumed, metabolism is as great in the tropics as elsewhere, but other evidence seems to show a zone of minimum metabolism near the optimum temperature, i.e. 60° to 70° F. As judged by the nitrogen in the urine there is a distinct tropical reduction in metabolism.

(6) Nervous system. Neurasthenia is undoubtedly common but may be partly due to other causes as well as climate.

(7) Clothing. A dark skin causes rapid heating and hence sweating and evaporation, thus cooling the body, but dark clothing has the opposite effect, for it merely holds the heat and prevents evaporation.

(8) Disease in general. Diseases are more common than elsewhere here because of (a) insects, (b) the weakening effect of heat, and (c) the unhygienic modes of life.

In the face of the evidence thus summarized the authors present a misleading section containing mortality tables. These appear to show that Queensland is the most healthy country in the world both for adults and for infants. In 1913 the general death rate is given as 10.4, against 10.8 for all of Australia, 12.3 for the Netherlands, 13.8 for England, and 14.1 for the registration area of the United States. These figures are worse than useless, for the population of Queensland, especially in the tropical parts, differs from that of an ordinary country in the following respects: (1) It is composed of settlers who are more energetic than the average of their countrymen. (2) It is largely migratory, and people who begin to feel the effect of the climate move away, so that their deaths are credited to some other region. (3) Most of the people are men from 20 to 40 years of age—ages at which the death rate is low. Women, who feel the tropical conditions more than men, are scarce. So, too, are old people, among whom, of course, the death rate is high, and young children, who feel a tropical climate most of all. (4) Indoor work in factories is very rare, but this is one of the great factors in raising the death rate in most of the countries that Breinl and Young use for comparison. (5) It is notorious that in a scattered, migratory population where physicians, clergymen, and officials are scarce and government is lax, a large number of deaths are not recorded even among highly civilized people.

The only proper way to determine the death rate in tropical Australia is to separate the population by age, sex, and occupation and then compare with a "standard" population. Even then allowance would have to be made for the migration of people who feel run down. Such a comparison would probably show a death rate at least double the 10.4 given by Breinl and Young. ELLSWORTH HUNTINGTON

Tropical Control of Australian Rainfall. The study of cirrus-cloud movements in relation to storm systems in Australia has led Mr. E. T. Quayle, who is supervising meteorologist of the Australian Commonwealth Bureau of Meteorology, to an investigation of the influence of tropical conditions upon the development and rainfall-production of storms in the temperate belt, and of the possibility of increasing the range and accuracy of the Australian rain forecasts ("Tropical Control of Australian Rainfall," *Commonwealth Bur. of Meteorol. Bull. No. 15*). The inland rains in Australia seem to be almost entirely dependent on drifts of air from lower latitudes, and it appears that the more directly these drifts take place in a southerly direction, the more abundant is the inland rainfall, assuming the rate of motion to be the same. The departures of the minimum temperature from normal were found to be the most available data for use in the endeavor to trace the origin of the inland rains. Graphical methods were employed for showing the relations between the temperature departures and the rainfall over several southern inland areas.

The results of this study have proved to be of the greatest value and have introduced a new, and most important, factor in rain forecasting. The conditions of the air in advance of and on the equatorial side of the path of disturbances which pass over the continent or along its southern coast line are the chief determining controls of the rainfalls which occur in connection with these disturbances. And, as the extent of this tropical influence can now be determined, by the method which is set forth in the present *Bulletin*, it has become possible to make the daily forecast more accurate as regards both the distribution and the amount of the rain which may be expected from each approaching storm. Thus, it appears that over the inland areas of South Australia and New South Wales, in winter, the rains are almost always preceded from one to two days by a marked rise of temperature over subtropical stations to the northwest. This rise is from 5° to 20° above normal and the greater the rise, the greater the rainfall. Further, the conditions in the subtropical belt are in their turn dependent upon the rain-producing influences in the adjacent tropical belt, and, as these tropical conditions change slowly, it becomes possible to forecast, some days in advance, whether the rains accompanying the disturbances passing over the southern districts will be heavier or lighter than the average. Years of heavy southern rainfalls frequently show a nearly direct north-south drift of tropical influences, while dry years show an excess of "streams of influence" from other directions. The neighborhood of New Guinea seems to give the first indication of most of the inland rains of Australia, with the possible exception of those of Western Australia.

Mr. Quayle's monograph is illustrated by means of curves and maps. The results of his study open up a new and interesting field for further research. The relation here established between the rains over southern Australia and tropical conditions may, as the author points out, be as important in other parts of the world as in Australia, although it may be less obvious in latitudes higher than those of southern Australia.

R. DeC. Ward

POLAR REGIONS

The Plant Food of the Smith Sound Eskimos. The *Geografisk Tidskrift*, the journal of the Royal Danish Geographical Society, in 1918 (Vol. 24, No. 8) published an interesting article by Peter Freuchen on the part which plants play as food in the domestic economy of the Smith Sound Eskimos—a minor geographical item which has never before been dealt with exhaustively. Naturally, Freuchen finds that plant food is no significant part of the Eskimo diet. The vegetation is too sparse to produce any considerable quantity of food, and, besides, the Eskimos have no way of preserving for winter use the little that might be collected in the short summer.

The commonest of all plant food used is the mass of slightly digested vegetable pulp in the paunch of the musk-ox and caribou, and this—called *neruvkarsuit* by the Eskimos—is considered a great delicacy among them. Especially is it highly prized when it is accompanied by *akutak*. *Akutak* is a mixture of equal parts of water, narwhal oil that has melted out of the blubber in sunshine, and musk-ox or caribou tallow, stirred together cold until it forms a light mass resembling beaten white of egg.

The plants which are used directly for food are ten or fifteen in number. The first flower which appears in the spring in Greenland is the purple saxifrage (*Saxifraga oppositifolia*). As soon as the snow melts down, this dainty little flower begins blooming, and in the course of a few days after the snow has left a bit of ground the plot becomes purple with its blossoms. Then it is no uncommon sight to see the Eskimo women and children go out with their little seal-skin cups and collect the flowers. These they eat much as children here eat red clover. Occasionally they mix the flowers with seal blubber; then the mixture is considered very good indeed.

The Arctic willow is used as food in several ways. Its newly opened green leaves are laid upon boiled meat, much as we use cress; also it is used in *iseqavik*, which is a mixture of half-rotted blubber, called *pujak*, with the willow down from the ripened willow catkins. The resulting mass is more like chewing gum than anything else, and the Eskimos use it as if it were. Caribou hunters who have to travel far overland like to keep chewing it all day long, because they say it keeps them from becoming hungry when they have nothing to eat.

One of the daintiest plants found in all North Greenland is *Silene acaulis*, a delicate little pink flower which grows in low round mats. Of this plant the Eskimos eat the root, which sometimes becomes as thick as a person's finger; more often it is only as thick as a lead pencil. When cooked carefully it tastes somewhat like carrots, and when made into soup, especially with whale blubber, it is very good.

The plant most used by the Eskimos is *Oxyria digyna*, a plant which tastes very much like sorrel. It grows almost everywhere in the North, and its red leaves and flower stems are visible for long distances. It tastes strongly of oxalic acid and because of its spicy sourness is particularly prized by the Eskimos as a dressing for meat. It is also eaten fresh just as it is gathered.

Two species of berries are found in the land, the "black" berry, or *Empetrum nigrum*, and the "blue" berry, or *Myrtillus uliginosa*, var. *microphylla*. In all, though, the berries are nowhere numerous, and Freuchen states that only once during all his stay in the North did the Eskimos gather more than they ate as they found them. A little farther south in Danish Greenland they are rather common and are preserved for winter use.

Apparently there are no poisonous mushrooms in Greenland, because the Eskimos do not hesitate to eat all species which they find. Likewise in times of stress they eat seaweed, both *Laminaria* and *Fucus*, boiling them down to a sort of jelly. The lichens, especially the big black *Gyrophora*, "tripe de roche," are also used in times of starvation, though the Eskimos state that continued use of these lichens causes disease.

Of late years the Smith Sound Eskimos have begun using *Pedicularis lanata* for a soup which tastes considerably like celery soup. The use of this plant has been introduced from Danish Greenland by the Eskimos who have come up from that region to live with the Smith Sound tribe.

But, Freuchen concludes, the fact remains that the Eskimos are satisfied only with a meat diet. Even after they have eaten at a white man's table a meal of cooked meat, vegetables, and fruit that would do justice to the heartiest white man's appetite, they resort at once after the meal to some raw walrus or seal meat, because, as they say, they are still hungry for some *real* food. W. Elmer Ekblaw

HUMAN GEOGRAPHY

Weather and Business. The Committee on Statistics of the Chamber of Commerce of the United States recently issued (1919) two bulletins, on business and weather in relation to rainfall and in relation to temperature. A paper on the general question of making practical use of such facts as are available was presented before the meeting of the American Meteorological Society at St. Louis, December 30, 1919, by Mr. A. W. Douglas of the Simmons Hardware Co. of St. Louis (*Monthly Weather Rev.*, Vol. 47, Dec., 1919, p. 867).

The two bulletins are based on the conclusion that spells of extreme heat and cold, of abundant rainfall and of deficient rainfall, tend to recur. Also, the same kinds of seasons have a tendency to recur, in the way of the association of dry years with dry years, and of wet years with wet years, for a comparatively brief period. Exceptions to this tendency occur, but in an experience of a number of years this general statement has proved to be fairly reliable for business purposes in from 75 to 80 per cent of the time.

A possible forecast of the general character of the weather, some months ahead, would obviously be of great advantage in relation to the probable sale of "seasonable goods," i.e. of "goods which sell only at certain seasons, and then because of the prevalence of certain kinds of weather." The author indicates that some degree of success has been attained by the application of the general principle of the probability of recurrence of certain types of seasons to the business in which he is interested. To quote: "Suppose a distributing house handling both lawn mowers and rubber hose wish to find out in August, 1918, about how they should order these goods for the coming season of 1919 compared with their sales in the season of 1918 just past. The theory I have spoken of forecast very definitely a wetter spring and summer in 1919 than in 1918 in the vicinity of St. Louis, and that is exactly what happened. Now, suppose this same house wished to know in February, 1919, what kind of an autumn and winter 1919–1920 would prove, as to temperature and snowfall, as compared with the similar season of 1918–1919, as affecting the sales of ice skates and snow shovels. The theory answers, a somewhat colder autumn and winter and rather more snow. Now, these incidents are the stories of actual happenings." R. DeC. Ward